

Date: Wednesday, 6/6/2007 1:48:35 PM
 User: Kim Johnston

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: ROUND BILLET 17-4
Job Number	: 32780A -- 1		
Estimate Number	: 10041		
P.O. Number	: N/A	Part Number	: D6104007
This Issue	: 6/6/2007 S.O. No. : N/A	Drawing Number	: D6104 REV B
Prsht Rev.	: NC	Project Number	: N/A
First Issue	: N/A Type : MACHINED PARTS	Drawing Revision	: B
Previous Run	: 32169A	Material	: N/A
Written By	:	Due Date	: 6/30/2007
Checked & Approved By	: <u>JA 07/06/07</u>	Qty:	20 Um: Each
Comment	: Est. A: 01.05.08 New Issue EC		

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0

PG

PURCHASING



Comment: PURCHASING

Issue P/O: 3934

CL 07/06/08 (20)

a) Description: S.S round billet

b) Ø4.50" x 5.10" long

c) Tolerance on all dimensions are +0.030"/-0.000"

d) Material: 17-4PH Stainless steel (Ams 5643 or Aisi 630)

e) One blank makes 2 parts

f) Material certification required

2.0

D6104007P

17-4 SS Roundbar 4.50"OD



Comment: Qty.: 1.0000 Each(s)/Unit Total : 20.0000 Each(s)

17-4 SS Roundbar 4.50"OD

3.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure material certification is attached

E 07/06/22 (20)

4.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

Ensure Material certification comply to Dwg D6104

B 07-06-25

20

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: AD Date: 07/10/23
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Wednesday, 6/6/2007 1:48:35 PM
User: Kim Johnston

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: ROUND BILLET 17-4

Job Number: 32780A

Part Number: D6104007

Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and Stock

Location: CNK

7-10-22

6.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

2011/10/3

Job Completion



U 8-10-22

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

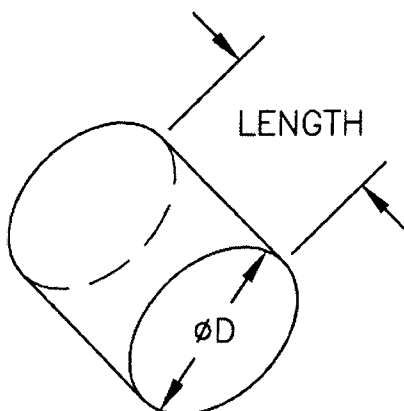


DESIGN RF	DRAWN BY 	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED 	APPROVED 	DRAWING NO. D6104	Rev. B SHEET 1 OF 1
DATE 02.11.25		TITLE ROUND BILLET, 17-4	SCALE NTS
A	01.04.10	NEW ISSUE	
B	02.11.25	CLARIFY ALLOY SPEC ADDED D6104-009/-011 REDUCE LENGTH OF BILLETS	

RELEASED

02.11.29

SPECIFICATION CONTROL DRAWING



MATERIAL: 17-4 PH SS (AMS 5643 OR AISI 630) MIN UTS = 170 KSI (38 HRC)

PURCHASE MATERIAL ACCORDING TO THE FOLLOWING TABLE. SPECIFY ALLOY, DIAMETER x LENGTH (+0.030/-0.000) AS SHOWN.

TOLERANCE ON ALL DIMENSIONS IS +0.030/-0.000.

ALL DIMENSIONS ARE IN INCHES

Part No.	Alloy	D (Diameter)	Length
D6104-001	17-4 PH STAINLESS STEEL	Ø3.00	3.80
D6104-003	17-4 PH STAINLESS STEEL	Ø3.25	3.80
D6104-005	17-4 PH STAINLESS STEEL	Ø4.00	5.10
D6104-007 ✓	17-4 PH STAINLESS STEEL	Ø4.50	5.10
D6104-009	17-4 PH STAINLESS STEEL	Ø5.25	4.10
D6104-011	17-4 PH STAINLESS STEEL	Ø6.50	4.10

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 32780A

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T-532 P006/006 F-232

514-695-3281

2-06-07 07:39 FROM-metax castle

31 553111 946258 01	14#31-	06/14/07	06/14/07	06/18/07	06/18/07	EXPEDIE	DATE CHARGE-LOADED	NO. COM.-ORD. NO.	POIDS TOTAL JOURNEE-TO
3. REQUISITION CLIENT-CUSTOMER REQUISITION NO.		NO. COM. CLIENT-CUST. ORD. NO.		COMPTES-ACCT.	VENDEURS	TERRE	EXPEDIE PAR-SHIP VIA	553111	
METEUR-PURCHASING AGENT		TELEPHONE		HC	TXE	NO. COM. ORD.	REGION LIVRAISON-DEL ZONE	F.A.B.-F.O.B.	BILL
CHANTAL		613 632-3336		9	9	1	C/C	PREPAID	NO. FEVILLE/EMBALLAGE-B/L NUMB
VRE A-SHIP TO:		VENDU A-SOLD TO:		INFORMATION CREDIT-CREDIT INFORMATION				ROUTE	
		DART AEROSPACE LTD 1278 ABERDEEN HAWKESBURY						01-NL-06. 31-NL-06.	
INSTRUCTIONS/LIVRAISON-DELIVERY		INSTRUCTIONS LIVRAISON (CONT.)-DELIVERY (CONT'D.)		INSTRUCTIONS LIVRAISON (CONT.)-DELIVERY (CONT'D.)					
ING-F56610									
SCRIPTION - ITEM 1									
4.0000 RD 17CR-4N1 CF SOL. TREATED COND A STNLS 5.10"									
GOLD									
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		QTE/UNITE COM.-ORDERED	
NBR OF DMTRS: MAIL W/MATL 1		TOL + 1/8" - 0 NO PACKAGING REQD PRIOR DIST/ORD: 01 946258		A18781 ✓				20 PCS PCS	
CASTLE (CHICAGO)		06/18/07		INSTRUCTIONS (CONT'D.)		20x5.10"		POIDS COM.-WT. ORDERED	
SCRIPTION - ITEM 2								34	
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		BALLOTS-BUNDLES	
		(1 Box)						PCES/PO EXP. SHP.	
SCRIPTION - ITEM 3								POIDS EST. GROSS WT.	
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		FORME-SHAPE	
								I.A.C.	
SCRIPTION - ITEM 4								AIRE/CHARGE-LOAD AREA	
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		ENT	
SCRIPTION - ITEM 5								QTE/UNITE COM.-ORDERED	
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		BALLOTS-BUNDLES	
								PCES/PO EXP. SHP.	
SCRIPTION - ITEM 6								POIDS COM.-WT. ORDERED	
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		POIDS EST. GROSS WT.	
								FORME-SHAPE	
SCRIPTION - ITEM 7								I.A.C.	
INSTRUCTIONS		INSTRUCTIONS (CONT'D.)		COULEE INFO-HEAT INFO		QTE-QTY		AIRE/CHARGE-LOAD AREA	
								ENT	

DIST.	NO. COM. ORD. NO.	NO. TRANS.	DC FROM	SUP NOT BEFORE	SUP NOT AFTER	DEL NOT BEFORE	DEL NOT AFTER	CL	A. RAIN	DATE CHARGE LOADED	NO. COM. ORD. NO.	POIDS TOTAL
31	553110	328523	10	06/13/07	06/13/07	06/18/07	06/18/07	NP	N	20	553110	
NO. REQUISITION CLIENT-CUSTOMER REQUISITION NO.				NO. COM. CLIENT-CUST. ORD. NO.		COMPT. ACCT.	VEND. SLB	TERR.	EXPEDIE PAR SHIP VIA		CO. MT. OR. INT.	
				P000003934		91037	200	40	BEST			
ACHETEUR-PURCHASING AGENT				TELEPHONE		HC	TAKE	NO. COM. ORD.	REGION LIVRAISON-DEL. ZONE		F.A.B.-F.O.B.	BILL
CHANTAL				613 632-3336		9	0	1	C/C		PREPAID	NO. FEVILLE/EMBALLAGE-B/L NUI
VIVRE A-SHIP TO:				VENDU A-SOLD TO:				INFORMATION CRÉDIT-CRÉDIT INFORMATION			ROUTE	
				DART AEROSPACE LTD 1270 ABERDEEN HAMKESBURY ON K6A 1K7							10-NL-0 30-NL-0 31-NL-0	
INSTRUCTIONS/LIVRAISON-DELIVERY				INSTRUCTIONS LIVRAISON (CONT.)-DELIVERY (CONT'D.)				INSTRUCTIONS LIVRAISON (CONT.)-DELIVERY (CONT'D.)				
ING-F56610												
DESCRIPTION - ITEM 1										QTE/UNITE COM. ORDERED		POIDS COM. - WT. OF
4.5000 RD 17CR-4NI RT SOL. TREATED COND A STNLS 5.10" GOLD										20 PCS		PCS
INSTRUCTIONS										BALLOTS-BUNDLES		POIDS EXP. - WT. SH
NBR OF CMTRS: MAIL W/MATL 1										1 20		490/4
INSTRUCTIONS (CONT'D.)										POIDS EST. GROSS WT.		FORME-SHAPE
TOL + 1/8" - 0 NO PACKAGING REQD PRIOR DIST/ORD: 10 328523										490		145
CASTLE (CLEVELAND)										35.640FT		
COULÉE INFO-HEAT INFO QTE-QTY										INSTRUCTIONS (CONT'D.)		AIRE/CHARGE-LOAD AREA
U1745-50										20 x 5.10		N3
INSTRUCTIONS (CONT'D.)												
DESCRIPTION - ITEM 2										QTE/UNITE COM. ORDERED		POIDS COM. - WT. OF
INSTRUCTIONS										BALLOTS-BUNDLES		POIDS EXP. - WT. SH
INSTRUCTIONS (CONT'D.)										POIDS EST. GROSS WT.		FORME-SHAPE
												I.A.C.
COULÉE INFO-HEAT INFO QTE-QTY										INSTRUCTIONS (CONT'D.)		AIRE/CHARGE-LOAD AREA
DESCRIPTION - ITEM 3										QTE/UNITE COM. ORDERED		POIDS COM. - WT. OF
INSTRUCTIONS										BALLOTS-BUNDLES		POIDS EXP. - WT. SH
INSTRUCTIONS (CONT'D.)										POIDS EST. GROSS WT.		FORME-SHAPE
												I.A.C.
COULÉE INFO-HEAT INFO QTE-QTY										INSTRUCTIONS (CONT'D.)		AIRE/CHARGE-LOAD AREA

22-06-07 07:38 FROM-metax castle

514-695-3281

T-532 P004/006 F-232

ORD.NO 00622313 P.O.#0126746

LOT. 00421853



GLORIA MATERIAL TECHNOLOGY CORP. INSPECTION CERTIFICATE

台南縣新營市新中街35號1樓
TEL: (06)5320000
FAX: (06)5320088

Messrs: ENERGY STEEL PRODUCTS INC

Order No: 2006003980

Grade: 17-4 PH

P.O.NO.: 91853-000 OP

FILE NO: 2006006726-A

Size: 4.5"

Date: 10/24/2006

HBAT-LOT No: 01745-50

Weight: 4034.0KG 8937.55LB

Pcs: 12

Condition: HF-Solution Annealed-Peeled

Chemical Composition (wt%)

	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	Nb+Ta
Min.						3.0	15.0		3.0	0.15
Max.	0.07	1.00	1.00	0.040	0.025	5.0	17.5	0.50	3.0	0.45
Result	0.03	0.36	0.66	0.023	0.001	4.7	15.8	0.08	3.2	0.27

	N	Nb	H	Ta
Min.		0.15		
Max.		0.45	0.0005	
Result	0.0480	0.27	0.0003	0.00029

Mechanical Properties Spec.

	Hardness	Grain Size	δ -Ferrite	H900-Hardness(Ave.)
Condition	1/2R			
Spec.Min.				40HRC
Spec.Max.	365HBN		5%	47HRC
Result	312HBN	7.5	0.3%	41.3HRC

Tensile Test

	Elongation(A)	Tensile Strength(Rm)	Yield Strength(Rp)	Reduction of Area(Z)
Condition				
Min.	10%	190KSI	170KSI	40%
Max.				
Result	15.6%	198KSI	173KSI	53.6%

Heat Treatment Condition

Condition	Temperature	Time/hour	Treatment
SOLUTION	1900°F	4.57	PAST AIR COOL

Non-Metallic Inclusions: AMS 2303E

	Severity	Frequency
Max.	0.35	0.4
Result	0.08	0.05

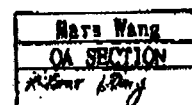
Specification:

1. ASTM A370-05, A484-05a, A564-04, A388-05.
2. AMS 5643Q, 2303E (Mag particle test).
3. ASME SA564(04), SA484(04).
4. EN 10204/3.1:B.
5. ENERGY SPEC, S31. REV.3.

Remark:

1. MANUFACTURING PROCESS: BAR+LHF+VOD, FORGED OR HOT ROLLED.

ISO 9001



Our quality and environment management systems have been certified by AS9100, ISO9001 QMS and 14001 EMS.
We hereby certify that the material described herein has been manufactured and tested with satisfactory results in accordance with the requirement of the above material specification.
We hereby the Inspection Certificate comply with EN 10204 3.1.

CASTLE METALS FP
DATE REC'D 220.7 IAC 14998
REVISED BY: TB



GLORIA MATERIAL TECHNOLOGY CORP. INSPECTION CERTIFICATE

台南縣新營市新中街95號1樓
TEL: (06)6320000
FAX: (06)6320008

Customers: ENERGY STEEL PRODUCTS INC.

Order No: 2006003980

Grade: 17-4 PH

FILE NO: 2006006726-A

Size: 4.5"

HEAT-Lot No: U1745-50

Weight: 4054.0KG 8937.53LB

P.O.NO.: 91853-000 OP

Date: 10/24/2006

P'cs: 12

Condition: HF-Solution Annealed-Peeled

2. MATERIAL IS FREE FROM MERCURY CONTAMINATION.
3. MACRO STRUCTURE OK.
4. MICRO STRUCTURE OK.
5. NO REPAIR BY WELDING.
6. ULTRASONIC TEST OK.
7. MECHANICAL PROPERTIES TESTED AS PER H900 CONDITION.

This report is a copy of original
mill certificate and verifies
that the product meets the
requirements as originally ordered
by Energy Steel Products.

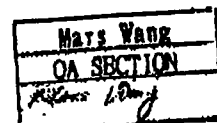
DATE 11-22-06



ISO 9001:2000



ISO 9001:2000+A001008



Our quality and environment management systems have been certified by AS9100, ISO9001 QMS and 14001 EMS.

SPECIALTY METALS
A Division of Crucible Materials Corporation

NEW YORK 13201

CERTIFICATE OF ANALYSIS

A M CASTLE, INC		A M CASTLE, INC		OUR ORDER NO. P5-18863-6-1	
3400 N WOLF RD		3400 N WOLF RD		DATE 05/14/07	
FRANKLIN PARK, IL 60131		FRANKLIN PARK, IL 60131		01	

CUSTOMER ORDER # & DATE 01-25540	CUSTOMER REQ. #	DISTRICT E RABUNGS	SHIPPED FROM SYRACUSE
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DESCRIPTION OF MATERIAL

CRU 17-4PH CG A IAC 14996
 AHC-3174-03 REV 18 ASME-SA564-04ED T630 ASTM-A564-04 T630
 AMS-5643B AMS-2303E AISI 430 UNS 4517400

SIZE

4 RD

HEAT NO.

CHEMICAL ANALYSIS

HEAT NO.	C	MN	P	S	SI	NI	CR	MO	CU	CK	TA
A18781	.050	.69	.026	.021	.42	4.14	15.53	.098	3.11	.27	.009

CASTLE METALS CORP.
 DATE RCVD 5/24/07
 IAC 14996
 APPROVED BY fw

QUANTITY

HEAT NO.

MECHANICAL PROPERTIES

8306 * A18781 TENSILE PSI YLD.2XPSI XELONG4D RED/AREA% HARDNESS
 BHN 343

CAPABILITY PHYSICALS AFTER 900 DEG. F. - 1 HR. AIRCOOL:
 200.870 180.530 11.4 51.8 BHN 401

MACRO TEST OK
 FERRITE 3 %
 MAGNAFLUX F/S = 0/0

REDUCTION RATIO: 16.3:1

MATERIAL SOLUTION TREATED AT 1900 DEG. F. HELD 1 HOUR AT TEMPERATURE -
 AIRCOOLED.
 CRUCIBLE MATERIALS CORP. VENDOR #18610.
 MATERIAL INGOT CAST.
 NAFTA - YES

MATERIAL FREE FROM MERCURY CONTAMINATION AT TIME OF SHIPMENT
 NO WELD REPAIR PERFORMED
 MATERIAL MELTED IN U.S.A.

THANK YOU FOR SELECTING A QUALITY PRODUCT

THE ABOVE MATERIAL WAS MANUFACTURED AND TESTED IN ACCORDANCE
 WITH ABOVE SPECIFICATIONS AND IS IN CONFORMANCE WITH THE
 SPECIFICATION REQUIREMENTS.

CRUCIBLE MATERIALS CORPORATION
 ACTING BY AND THROUGH ITS SPECIALTY METALS DIVISION

SWORN TO AND SUBSCRIBED BEFORE ME THIS

DAY OF _____, 20

CERTIFIED BY

NOTARY PUBLIC

QUALITY ASSURANCE REPRESENTATIVE

QUALITY ASSURANCE REPRESENTATIVE

